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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/506,418

03/30/2005

Ya-Jane Wang

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EXAMINER

ASINOVSKY, OLGA

ART UNIT

PAPER NUMBER

1796

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/506,418	<b>Applicant(s)</b> WANG ET AL.	
	<b>Examiner</b> OLGA ASINOVSKY	<b>Art Unit</b> 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 January 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-19 is/are pending in the application.
- 4a) Of the above claim(s) 19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                        |                                                                   |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>01/02/2008</u> .                                              | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response to Amendment*

1. Applicants amend each independent claim 1, 10 and 17 by the definition that a granular starch is unplasticized and has a moisture content of less than about 1%, and a compatibilizer comprises a polymer and a grafting compound, wherein said grafting compound is covalently bound to the polymer. The term “unplasticized” is supported in the original specification at page 11, line. The “moisture content of less than about 1%” is supported at page 14 in the example 1.
2. Cancellation of claim 2 is noted
3. Upon the present amendment, the reconsideration of the rejections over the cited references in the mailed office action of 11/29/2007 is made in the present office action below.
4. Newly submitted claim 19 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: new claim 19 is depending on claim 1. New claim 19 drawn to a compatibilizer comprising a polymer and a grafting compound, wherein said grafting compound is covalently bound to a polymer, wherein the grafting compound is selected from the group consisting of epoxides. Although a compatibilizer in claim 1 is generic, the compatibilizer is a maleic anhydride (original claims 5 and 13), or maleic anhydride cited under Markush group practice in the independent claim 17, and focusing on preferred maleic anhydride in the working example in the original specification. In claim 19 wherein the grafting compound

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is covalently bound to a polymer, wherein the grafting compound is selected from the group consisting of epoxides will require a new search.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 19 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jane et al U.S. Patent 5,115,000 in view of Dehennau et al U.S. Patent 5,510,401 and further in view of Kozma et al U.S. Patent 6,242,503 as evidence for forming a covalent bond between the polymer and the maleic anhydride.

All references have been considered in the previous office action mailed on 11/29/2007. Jane discloses a composition comprising a granular starch, oxidized polyethylene and polyethylene which has not been modified, column 2, lines 4-7 and 27. Granular starch includes unmodified starches, col. 2, line 12. The unmodified starch is readable in the present claims 1, 3-18. The starch comprises up to 50% of the composition. The oxidized polyethylene comprises up to 15% of the composition, and the remaining

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amount is the polyethylene, column 1, lines 59-66. The amount of the ingredients is readable in the present claims. The oxidized polyethylene is a compatibilizer agent between the starch and polyethylene, column 2, lines 32-37, for the present claims 1, 10 and 17. The carboxy groups on the oxidized polyethylene form ester bonds with the hydroxyl groups on the starch, column 2, lines 36-38. Jane discloses a process for synthesizing a biodegradable plastic composition. The components are blended while heated at a temperature of 110 C to 200 C, column 1, lines 61-62. Although, Jane does not mention about claimed moisture content of less than 1% of the granular starch, this statement is inherent, because upon the heating the components at 110 to 200 C water is evaporate.

Jane does not mention that a grafting compound is covalently attached to a polymer.

Dehennau discloses a biodegradable film produced from a composition comprising a starch, polyethylene modified by grafting maleic anhydride and a non-modified polyethylene, column 6, lines 20-35, for the present claims. The maleic anhydride grafted on to polyethylene is readable for being claimed compatibilizer in the present claims. The starch includes a wheat starch and/or potato starch, column 3, lines 27-28. The starch may be dried, column 4, line 7. The polymer serving as the coupling agents=compatibilizer are active towards the hydroxyl functional groups of the starch, column 3, lines 44-48. A process for producing a biodegradable film includes step of mixing the ingredients under 160 C, column 4, line 31.

Dehennau does not mention that maleic anhydride is covalently bound polyethylene.

Jane and Dehennau inventions belong to the analogous prior art similar utility for producing a biodegradable polymer.

Kozma discloses the maleated polyethylene, wherein maleic anhydride-grafting is covalently bonding one or more maleic anhydride groups to the original polymer chains, column 4, lines 23-29 and column 7, lines 35-37.

Kozma is cited an evidence for creating covalent bond between the polyethylene and grafted maleic anhydride.

It would have been obvious to one of ordinary skill in the art to substitute the carboxylic groups containing oxidized polyethylene in Jane invention with a grafted maleated anhydride modified polyethylene in Dehennau invention because oxidized polyethylene in Jane invention and maleated polyethylene in Dehennau belong to the analogous organic acid functionalized polyethylene, and such modification will not change the chemical reaction with starch component; and in light of the evidence in Kozma invention, the covalent bond between the polyethylene and grafted maleic anhydride is also created in Dehennau invention since the same polyethylene and the same grafted maleic anhydride are readable in Dehennau and Kozma invention in absence of any unexpected results.

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6. Claims 1, 3-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dehennau et al U.S. Patent 5,510,401 in view of Andersen et al U.S. Patent 6,231,970 and in view of Kozma et al U.S. Patent 6,242,503, and further in view of Chinnaswamy et al U.S. Patent 5,496,895.

Dehennau and Kozma have been considered above.

Dehennau does disclose starch, which can be dried; graft maleated polyethylene and polyethylene. Dehennau does not mention a low moisture content of dried starch.

Andersen discloses thermoplastic starch composition, wherein starch is in unmodified state in granular form and dried, column 2, lines 33-35 and 39, 52. Water can be removed before processing by using starch that has been predried, or alternatively, water can removed during processing the molten mixture, column 4, lines 32-35. The moisture content is below about 1%, column 20, lines 35-41.

In light of the dried condition of starch to the moisture content below to 1% as disclosed in Andersen invention, it would be obvious to one of ordinary skill in the art to substitute a dried starch in Dehennau invention with a dried starch having low moisture content in Andersen invention for the purposes to improve stability of starch during the starch/polymer melt process and eliminate gassing impurity.

Dehennau does not mention that a grafting compound=maleic anhydride is covalently attached to a polymer.

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Kozma is cited as evidence for creating covalent bond between the polyethylene and grafted maleic anhydride.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use known technique for creating covalent bond between the polyethylene and grafted maleic anhydride in Kozma invention for the analogous polyethylene grafted with maleic anhydride in Dehennau invention since the same results would be expected, and thereby obtain the claimed requirement wherein the maleic anhydride is covalently attached to the polyethylene.

Dehennau does not disclose that the compatibilizer and the granular starch become covalently bound in the present claim 10, wherein the compatibilizer comprises a grafting compound and polymer.

Chinnaswamy discloses biodegradable polymer composition comprising a starch and non-biodegradable plastic, wherein the non-biodegradable polymer is treated by adding an oxidizing agent. The non-biodegradable polymer includes any alkyne or alkene chain including polyethylene, polypropylene, polystyrene, column 3, lines 33-38, for the present claims 6 and 10. The oxidizing agent includes (met)acrylic acid, column 3, lines 46 and 54. The treatment (by adding an oxidizing agent under heat and pressure) creates reactive groups such as aldehyde or hydroxyl groups on the non-biodegradable polymers. The starch and the treated non-biodegradable plastic covalently bound to each other, claim 1 at column 8. The compatibilizer in claim 10 is maleic anhydride



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grafted polymer referring to the present claims 12 and 13. Chinnaswamy does disclose that starch and the treated non-biodegradable polymer are covalently bound.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the known method for creating covalent bond between the maleic anhydride grafted polyethylene and starch in Chinnaswamy invention for the analogous process for producing a biodegradable film comprising polyethylene grafted with maleic anhydride and starch in Dehennau invention for obtaining the adequate results, and thereby, obtain the claimed requirement wherein the compatibilizer and the starch are covalently bound.

7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dehennau et al U.S. Patent 5,510,401 in view of Andersen et al U.S. Patent 6,231,970 and in view of Kozma et al U.S. Patent 6,242,503, and further in view of Chinnaswamy et al U.S. Patent 5,496,895 as applied to claims 1, 3-17 above, and further in view of Papazoglou U.S. patent 5,216,075.

Dehennau does not disclose the claimed compatibilizer that is maleic anhydride grafted poly(styrene-ethylene-butylene-styrene) in the present claim18.

In light of the discussions in the paragraph 6 above, the unmodified dried starch granules can have low moisture content by teaching in Andersen invention. The grafted polymers having functional groups have chemical reaction with the hydroxyl functional groups of the starch.

Papazoglou discloses maleated block copolymer such as functionalized styrene-ethylene/1-butene-styrene (S-E/B-S) rubber, column 7, lines 43-50. The maleated (S-E/B-S) block copolymer is commercially available.

It would have been obvious to one of ordinary skill in the art to substitute the grafted maleic anhydride polyethylene in Dehennau invention with maleated block copolymer (S-E/B-S) in Papazoglou invention as potential options because maleated polypropylene in Dehennau and maleated block copolymer in Papazoglou work equally well to create a chemical reaction with starch with reasonable expectation of success.

The closest reference Patent 5,667,574 to Zhang cited under X category in the PCT/US03/05661 has been considered. While Zhang discloses unmodified starch, coupling agent and alpha-olefin polymer, Zhang does not disclose a covalent bond between the coupling agent and alpha-olefin polymer.

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to OLGA ASINOVSKY whose telephone number is (571)272-1066. The examiner can normally be reached on 9:00 to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Randy Gulakowski/  
Supervisory Patent Examiner, Art Unit 1796

Olga Asinovsky  
Examiner  
Art Unit 1796

March 1, 2008